SPECIFICATION

GoosLock - A locking device for Gooseneck trailers

REFERENCES CITED

5181405	January, 1993	Wheeler
5255545	October, 1993	Wheeler
5263735	October, 1993	Mann
5322316	June, 1994	Wheeler
5513871	May, 1996	Johnson
5520030	May, 1996	Muldoon
6109078	August, 2000	Marshall
6264229	July, 2001	Gill et al.
6315315	November, 2001	Seale
6464241	October, 2002	Daniel

FEDERAL RESEARCH STATEMENT

No federal research funds were used to support the invention and/or development of this device

BACKGROUND OF INVENTION

According to law enforcement agencies, many thousands of trailers are reported stolen each year. Most are unlocked and/or unprotected from theft. This invention is intended to prevent thefts-of-opportunity. The invention (locking device) is to be used by individuals, and by those in the agricultural, construction, and other industries where Gooseneck type trailers are used. It provides a theft deterrent for un-hooked/parked trailers.

Most gooseneck trailer couplers in common use include "safety" features which are designed to prevent a coupler from becoming detached from a towing vehicle during normal towing operations. The "safety"

features include spring loaded latching plates, vertical rods to secure the relative position of the coupler plates, and horizontal rods to reduce the size of the coupler opening. The couplers currently in widespread use do not provide any built-in means of protecting a trailer from theft.

There is a need for an effective, inexpensive, quickly installed lock for trailers with gooseneck couplers. The vast majority of trailer thefts occur when a potential thief identifies an unlocked trailer in an insecure location. The time spent at the crime scene is critical in this type of theft. It takes less than two minutes to connect an unlocked trailer to a tow vehicle. Most people involved in theft have access to a tow vehicle equipped with a standard 2-5/16 inch towing ball. Other methods which do not require the use of a coupler and towing ball are used to steal trailers, but they represent a very small percentage of the overall numbers. A professional thief can steal a trailer whether it is locked or not. Thefts-of-opportunity can be deterred by using a locking device which will not allow standard towing balls (2-5/16, 2, and 1-7/8 inch) to be used to connect to the trailer. The locking device must resist the use of bolt-cutters, hacksaws, pry bars, and hammers. Considerable time and noise must be involved to forcibly remove the locking device.

The prior art is composed of locks which are relatively large, cumbersome, expensive, and time consuming to install and remove. Due to their nature they are often left in the cab or bed of the tow vehicle, or in a shop or barn, and are not installed. Most are comprised of two or more components which can be misplaced. They are designed to prevent theft by inserting an obstructing object into or over the towing ball opening of the coupler. The obstructing object is normally formed as a part of a complex casting or multiple welded components. The assembled unit surrounds the coupler and holds the obstruction in place when secured with an internal or external lock. Another method used to prevent the obstruction from being removed is to attach the unit to the coupler lever handle. Other designs incorporate a telescoping pole attached to an obstruction at the coupler end, and to trailer jack stand components at the other end.

U.S. Pat. No. 6,464,241 issued October, 2002, to Daniel for Gooseneck trailer hitch, is an example of the widespread use of a vertically oriented rod to maintain the relative position of the coupler plates during normal towing operations. This design also incorporates the use of a spring to pre-position the lower plate

of a coupler and assist the user when connecting a trailer to a tow vehicle. This Gooseneck trailer hitch provides no theft deterrent protection features.

U.S. Pat. No. 5,263,735 issued October, 1993, to Mann for Gooseneck trailer coupler, is another example of the widespread use of a vertically oriented rod designed to maintain the relative position of the coupler plates during normal towing operations. This Gooseneck trailer hitch provides no theft deterrent protection features.

U.S. Pat No. 6,264,229 issued July, 2001, to Gill et. Al. for Gooseneck trailer coupler, is an example of a coupler which incorporates the use of a chuck and pinion gear which rotate to position jaws that are designed to narrow the coupler opening and prevent the coupler from becoming detached from a towing ball. This coupler design is significantly different than couplers in widespread use which incorporate a fixed upper plate and a moveable bottom plate.

U.S. Pat. No. 6,315,315 issued November, 2001, to Seale for Gooseneck Trailer Lock, is an example of the type of lock that obstruct the coupler opening using a complex casting and an integrated lock.

U.S. Pat. No. 5,181,405 issued January, 1993, to Wheeler for Gooseneck trailer hitch lock, and U.S. Pat. No. 5,255,545 issued October, 1993, to Wheeler for Gooseneck trailer hitch locking device, are examples of the type of lock that surrounds the coupler with multiple complex parts.

U.S. Pat. No. 5,322,316 issued June, 1994 to Wheeler for Anti-theft coupler device, is an example of the type of lock that surrounds the coupler and inserts an obstruction into the coupler opening. The device is designed to work with couplers which use a horizontally oriented shaft to narrow the coupler opening versus a coupler with a fixed upper plate and moveable bottom plate.

U.S. Pat. No. 5,513,871 issued May, 1996, to Johnson for Gooseneck Trailer Hitch Locking Device is an example of the type of lock that obstructs the coupler opening using multiple welded components which are secured in place by attaching to the coupler lever handle.

U.S. Pat. No. 5,520,030 issued May, 1996, to Muldoon for Gooseneck trailer lock, and U.S. Pat. No. 6,109,078 issued August, 2000 to Marshall for Trailer and jack stand lock assembly, are examples of locks which use multiple components and incorporate a telescoping pole which extends from the coupler opening to the trailer jack stand assembly.

All of the referenced gooseneck coupler locks are relatively expensive, difficult to fabricate, and use additional materials to obstruct the coupler opening. The locking device claimed works in cooperation with existing coupler components and secures the coupler in a self-obstructing position. For that reason it is much smaller, very simple, and less expensive to produce. In addition, the device can be attached to the coupler to prevent it from being lost and to keep it handy for locking a parked trailer. The preferred application of the locking device incorporates a rectangular block-style padlock with narrow shackle gap to resist bolt-cutters; hardened, rotating steel shackle pinned at both the toe and heel end to resist hacksaws; and hardened steel anti-saw rods formed into the padlock body to resist sawing.

SUMMARY OF INVENTION

The locking device disclosed and claimed disables normal coupler operation by restricting the movement of the lower latching plate of a gooseneck trailer coupler when the coupler is placed in a fully closed, self-obstructing position. When properly installed and secured with an appropriate padlock, the locking device prevents the typical 2-5/16, 2, and 1-7/8 inch towing-ball from entering the gooseneck coupler, thus deterring theft of an un-hooked trailer.

The locking device is simple, easy to install, inexpensive, and requires no modification to an existing gooseneck coupler. The locking device can be easily attached to the trailer coupler to prevent the locking device from being lost or misplaced.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 is a perspective view of the locking device in a form used for the most common couplers.

Figure 2 is a perspective view of a modified form of the locking device.

Figure 3 is a perspective view of one of the most common gooseneck coupler types (prior art).

Figure 4 is a side view of one of the most common gooseneck coupler types (prior art).

Figure 5 is a bottom view of one of the most common gooseneck coupler types placed in a normally closed position (prior art).

Figure 6 is a bottom view of one of the most common gooseneck coupler types placed in a fully closed position (prior art).

Figure 7 is a perspective view which shows the locking device installed from the front of one of the most common gooseneck coupler types toward the back of the coupler, providing a locking opportunity at the rear of the coupler.

Figure 8 is a perspective view which shows the locking device installed from the back of one of the most common gooseneck coupler types toward the front of the coupler, providing a locking opportunity at the front of the coupler.

DETAILED DESCRIPTION

As required, detailed embodiments of the locking device are disclosed. However, it is to be understood the locking device may be embodied in variations of the forms provided in FIG 1 and FIG 2 to accommodate variations in gooseneck coupler manufacturer designs, and the locking device may be constructed by using several hardened materials, including but not limited to, plate steel, cast iron, steel alloys, and wire rope. Therefore, specific functional details disclosed in this document are not to be interpreted as limiting, but merely show the basis for the claim and serve as a representation of the locking device.

The locking device, FIG 1 and FIG 2, is a locking component for gooseneck couplers, FIG 3, such as those incorporated on most utility type trailers, including horse, stock, flatbed, job site, box, and others, which extend over the bed of a tow vehicle and are lowered onto a towing-ball mounted on the vehicle. A gooseneck coupling device typically has two positions - one is open to allow the coupler to slide over a towing-ball, and the other is normally closed, FIG 5, to prevent the towing ball from being pulled from the coupler while the trailer is being towed.

Viewed from above, a typical gooseneck coupler contains two main components - one is a fixed upper plate, 6-FIG. 3, which includes a socket for a towing-ball, 7-FIG. 3, and the other is a moveable, lower latching plate, 11-FIG. 3. The latching plate is hinged to the fixed upper plate to allow horizontal movement of the latching plate. The latching plate is held in position at the front of a coupler by a short hinge-pin. Typically, the hinge-pin contains a shoulder or head on one end. It is inserted through holes in the upper and lower coupler plates, and is welded to one of the plates to prevent removal of the hinge-pin, 12-FIG 3 and 12-FIG 4. The latching plate is held in position at the rear of a coupler by a metal band, 8-FIG 3 and 8-FIG 4. Both ends of the metal band are welded to the lower latching plate or the band is created as a part of the lower plate during the casting process. The metal band is shaped to extend above and parallel to the fixed upper plate. The band, 8-FIG 3 and 4, the upper plate, 6-FIG 3 and 4, and the lower latching plate, 11-FIG 3 and 4, contain holes, 9-FIG 3 and 9-FIG 4. When aligned as shown in 9-FIG 5, the holes allow a vertically oriented cylindrical rod/lever 16-FIG 4, to be inserted through the band of the lower plate, 8-FIG 4, the upper plate, 6-FIG 4, and the lower plate, 11-FIG 4. The function of the

lever is to secure the relative position of the upper and lower plates in a normally closed position during towing operations. The user may insert or retract the lever from the holes by grasping the lever handle, 18-FIG 4, and applying hand pressure in the appropriate direction.

Viewed from below, a typical gooseneck coupler contains a fixed upper plate, 6-FIG 5, a movable lower latching plate, 11-FIG 5, a hinged front, 12-FIG 5, and a socket or opening for a towing ball, 7-FIG 5. In a normally closed position, when the holes in the upper and lower plate are aligned, 9-FIG 5, and when the relative position of the plates are secured by the safety lever, 16-FIG 4, the coupler opening will not allow a 2 5/16 inch towing-ball to be removed from the coupler, thus preventing the trailer from becoming un-hooked from the tow vehicle. The dimension shown in, 13-FIG 5, illustrates this condition, i.e. the dimension is slightly less than 2 5/16 inches.

The lower latching plate of most gooseneck couplers will travel past the point where the hole in the fixed upper plate and the holes in the lower latching plate are aligned. This past-closed-position is illustrated by 15-FIG 3, 6, 7 and 8. The locking device takes advantage of this condition. When the lower latching plate is moved as far as it will travel toward the closed position, FIG 6, the opening, 13-FIG 6, is small enough that it will not accommodate a 2-5/16 inch, 2 inch or a 1-7/8 inch towing-ball. In this "locked" position the coupler opening is obstructed by the position of the lower latching plate in relation to the fixed upper plate. A coupler placed in a fully closed orientation provides an opportunity to "lock" the coupler and prevent it from being attached to a tow vehicle.

The locking device is designed to be inserted into an opening between the fixed upper plate and the horizontal band of the lower latching plate, 10-FIG 3 when the lower latching plate is moved to the fully closed position. The lower latching plate must be moved as far as it will travel in the past-closed-position, as illustrated by FIG 6. When the locking device is inserted in either orientation, as shown in FIG 7 and FIG 8, movement of the lower latching plate is restricted. The locking device must be secured in place. This is accomplished by the design of the locking device and by use of a padlock inserted through one of the holes provided in the locking device, 3-FIG 1, 2, 7, and 8. The hole closest to the coupler, which

provides a clear path for the lock shackle, is to be used. When the locking device is secured in place, the coupler opening, 13-FIG 6, is too small to allow a standard sized towing-balls to be inserted into the coupler, thus preventing the trailer from being connected to a tow vehicle equipped with a typical towing-ball, without first removing the locking device and opening the coupler to a normally-opened position. The trailer coupler opening is obstructed by itself, the locking device secures the coupler in a fully closed position, and the trailer is protected from theft.

There are distinct differences between the safety features incorporated into common gooseneck couplers and the locking device. Safety features, such as spring loaded latching plates and vertically oriented rods used to secure the relative position of the top and bottom plates, provide a measure of safety to prevent the coupler from becoming detached from a towing ball while a trailer is being towed. Safety features allow a user to connect and disconnect a trailer using normal force of hand. The locking device is used to disable normal coupler operations, and provides theft protection for un-hooked or parked trailers. The plates of the coupler are secured in a position which obstructs the coupler opening and prevents the trailer from being attached to a tow vehicle without first removing the locking device, either by unlocking it or by defeating the locking device by force.

The locking device as illustrated in FIG 1 and FIG 2, is a single piece of T-1 (ASPM A514, 100,000 minimum yield, 100,000 tensile) steel. It may be cut from plate steel using standard metal cutting techniques. The steel should be of sufficient hardness and thickness to resist attempts to defeat the locking device. The locking device is designed with a curved, tapered shaft, 1-FIG 1, of appropriate dimensions and sufficient width, 4-FIG 1 and 4-FIG 2, and thickness, 5-FIG 1 and 5-FIG 2, to allow it to pass through an opening, 10-FIG 3, between the fixed upper plate and the horizontal band of the lower latching plate. The locking device is designed with a block end, 2-FIG 1 and 2-FIG 2, which limits the distance the locking device will travel when inserted through the opening in a coupler. When the locking device is inserted fully into the opening, until the block end of the locking device contacts the coupler, the length of the tapered shaft of the locking device must be sufficient to extend past the material of the lower latching plate, 11-FIG 7 and 11-FIG 8, of the coupler and provide a method to secure the locking device in place.

Holes, 3-FIG 1 and 3-FIG 2, which are of an appropriate diameter to accommodate a typical padlock shackle, must be created in the tapered shaft. Holes must be placed in the shaft at specific locations dependent upon the gooseneck coupler manufacturer design and tolerances, to provide a clear path for a padlock shackle, but close enough to the coupler to limit forward and backward movement of the locking device within the opening, 10-FIG 3. The width of the tapered shaft of the locking device, 4-FIG 1 and 4-FIG 2, must be sufficient to prevent excessive horizontal movement of the lower latching plate while accommodating the less-than-perfect tolerances of common gooseneck couplers. The thickness of the locking device, 5-FIG 1 and 5-FIG 2, must be sufficient to prevent the locking device from being forced into a position other than that of the design. The block end of the locking device must be of a specific size and shape to prevent it from passing through the opening as illustrated in, FIG 7 and to limit the distance it will travel into the opening as illustrated in FIG 8.